

THE INVENTION CLAIMED IS:

1. A conveyor system adapted for use in delivering substrate carriers within a semiconductor device manufacturing facility comprising:

5 a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to:

be flexible in a horizontal plane and rigid in a vertical plane; and

10 transport a plurality of substrate carriers within the at least a portion of the semiconductor device manufacturing facility.

2. The conveyor system of claim 1 wherein the ribbon comprises:

a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon.

3. The conveyor system of claim 2 wherein the vertical and horizontal portions are formed from a single piece of material.

25 4. The conveyor system of claim 2 wherein the vertical and horizontal portions are formed from separate pieces of material.

30 5. The conveyor system of claim 4 wherein the horizontal portion comprises a plurality of horizontal sections coupled to the vertical portion.

6. The conveyor system of claim 5 wherein the plurality of horizontal sections comprise a plurality of triangular sections.

5           7. The conveyor system of claim 2 wherein the horizontal portion comprises a plurality of slots adapted to increase flexibility of the ribbon in a horizontal direction.

10           8. The conveyor system of claim 7 wherein the plurality of slots are evenly spaced along the ribbon.

          9. The conveyor system of claim 1 wherein the ribbon comprises:

15           a first section having:  
                    a vertical portion adapted to support substrate carriers; and  
                    a horizontal portion adapted to support a weight of the ribbon; and  
20           a second section coupled to the first section and having:  
                    a vertical portion adapted to support substrate carriers; and  
                    a horizontal portion adapted to support  
25 a weight of the ribbon.

          10. The conveyor system of claim 9 further comprising a sound dampening material disposed between the first and second sections.

30           11. The conveyor system of claim 9 wherein:

the vertical and horizontal portions of the first section are formed from a first, single piece of material; and

5 the vertical and horizontal portions of the second section are formed from a second, single piece of material.

12. The conveyor system of claim 9 wherein:  
the vertical and horizontal portions of the  
10 first section are formed from first, separate pieces of material; and

the vertical and horizontal portions of the second section are formed from second, separate pieces of material.

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13. The conveyor system of claim 12 wherein:  
the horizontal portion of the first section  
comprises a first plurality of horizontal sections coupled  
to the vertical portion; and  
20 the horizontal portion of the second section  
comprises a second plurality of horizontal sections coupled  
to the vertical portion.

14. The conveyor system of claim 13 wherein:  
25 the first plurality of horizontal sections  
comprise a first plurality of triangular sections; and  
the second plurality of horizontal sections  
comprise a second plurality of triangular sections.

30 15. The conveyor system of claim 9 wherein:  
the horizontal portion of the first section  
comprises a first plurality of slots adapted to increase  
flexibility of the ribbon in a horizontal direction; and

the horizontal portion of the second section comprises a second plurality of slots adapted to increase flexibility of the ribbon in the horizontal direction.

5           16. The conveyor system of claim 15 wherein the first and second plurality of slots are evenly spaced along the ribbon.

10           17. The conveyor system of claim 1 wherein the ribbon comprises stainless steel.

15           18. The conveyor system of claim 1 wherein the ribbon comprises a vertical portion having a first feature adapted to identify a beginning of the ribbon.

          19. The conveyor system of claim 18 wherein the first feature comprises at least a first opening formed through the vertical portion.

20           20. The conveyor system of claim 18 wherein the vertical portion of the ribbon further comprises a plurality of second features, each second feature adapted to identify a location at which a substrate carrier may be held and transported by the ribbon.

25           21. The conveyor system of claim 20 wherein each second feature comprises at least a second opening formed through the vertical portion.

30           22. The conveyor system of claim 21 wherein the at least a first opening comprises a first plurality of openings and wherein the at least a second opening comprises a second plurality of openings.

23. The conveyor system of claim 1 wherein the ribbon forms a serpentine closed loop.

5           24. The conveyor system of claim 1 further comprising a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a substrate carrier within the at least a portion of the semiconductor device manufacturing facility.

10           25. The conveyor system of claim 24 wherein each of the plurality of supports comprises a cradle adapted to support a substrate carrier by a top flange of the substrate carrier.

15           26. The conveyor system of claim 1 further comprising at least one driving wheel adapted to contact the ribbon and to rotate the ribbon.

20           27. The conveyor system of claim 26 wherein the at least one driving wheel comprises a plurality of driving wheels evenly spaced around the ribbon.

25           28. The conveyor system of claim 26 wherein the at least one driving wheel is adapted to contact and drive the ribbon along a vertical portion of the ribbon.

30           29. The conveyor system of claim 28 wherein the at least one driving wheel comprises a first wheel adapted to contact the vertical portion of the ribbon on a first side of the vertical portion and a second wheel adapted to contact the vertical portion of the ribbon on a second side of the vertical portion opposite the first side.

30. The conveyor system of claim 29 wherein only one of the first and second wheels drives the ribbon.

5           31. The conveyor system of claim 29 wherein both the first and second wheels drive the ribbon.

10           32. The conveyor system of claim 26 wherein the at least one driving wheel comprises at least one driving wheel adapted to be replaced while the ribbon is in motion.

15           33. The conveyor system of claim 1 further comprising at least one constraining wheel adapted to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

20           34. The conveyor system of claim 33 wherein the at least one constraining wheel comprises a plurality of constraining wheels evenly spaced around the ribbon.

25           35. The conveyor system of claim 33 wherein the at least one constraining wheel comprises at least one constraining wheel adapted to be replaced while the ribbon is in motion.

30           36. The conveyor system of claim 33 wherein the at least one constraining wheel comprises a first wheel adapted to contact the ribbon along a first side of a vertical portion of the ribbon.

37. The conveyor system of claim 33 wherein the at least one constraining wheel comprises a first wheel and

a second wheel each adapted to contact the ribbon along the first side of the vertical portion of the ribbon.

5        38. The conveyor system of claim 37 wherein the first wheel and the second wheel are adapted to be replaced while the ribbon is in motion.

10       39. The conveyor system of claim 38 wherein the first wheel and the second wheel are adapted to be replaced as a unit while the ribbon is in motion.

15       40. The conveyor system of claim 38 wherein the first wheel and the second wheel are adapted to be replaced independently while the ribbon is in motion.

20       41. The conveyor system of claim 40 wherein each of the first wheel and the second wheel is adapted to pivot away from the ribbon.

25       42. The conveyor system of claim 36 wherein the at least one constraining wheel comprises at least a first wheel adapted to contact the ribbon along the first side of the vertical portion of the ribbon and at least a second wheel adapted to contact the ribbon along a second side of the vertical portion of the ribbon opposite the first side.

30       43. The conveyor system of claim 1 further comprising at least one support wheel adapted to support the ribbon as the ribbon rotates.

44. The conveyor system of claim 43 wherein the at least one support wheel comprises a plurality of support wheels evenly spaced around the ribbon.

45. The conveyor system of claim 43 wherein the at least one support wheel is adapted to contact and support the ribbon along a first horizontal portion of the ribbon.

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46. The conveyor system of claim 45 wherein the at least one support wheel comprises a first wheel adapted to contact the first horizontal portion of the ribbon on a first side of a vertical portion of the ribbon and a second wheel adapted to contact a second horizontal portion of the ribbon on a second side of the vertical portion opposite the first side.

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47. The conveyor system of claim 43 wherein the at least one support wheel comprises at least one support wheel adapted to be replaced while the ribbon is in motion.

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48. The conveyor system of claim 1 further comprising a plurality of housing sections adapted to surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

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49. The conveyor system of claim 48 wherein at least one housing section comprises:

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a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

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50. The conveyor system of claim 49 wherein the at least one housing section is adapted to allow the at



least one constraining wheel and the at least one support wheel to be changed while the ribbon is in motion.

51. The conveyor system of claim 49 wherein the  
5 at least one housing section further comprises:

a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

10 52. The conveyor system of claim 51 wherein the housing section is adapted to allow the at least one driving wheel, the at least one constraining wheel and the at least one support wheel to be changed while the ribbon is in motion.

15 53. The conveyor system of claim 48 further comprising a plurality of supports adapted to couple to and support each housing section.

20 54. The conveyor system of claim 53 wherein the plurality of supports and the plurality of housing sections surround at least a portion of the ribbon along an entire closed loop of the ribbon.

25 55. The conveyor system of claim 53 further comprising a plurality of shields adapted to couple to the plurality of supports and sized to cover substrate carriers being transported by the ribbon.

30 56. The conveyor system of claim 55 wherein at least one of the plurality of supports comprises an extended region adapted to compensate for a change in length of the

plurality of shields caused by a change in temperature of the plurality of shields.

57. The conveyor system of claim 55 wherein each  
5 shield comprises aluminum.

58. The conveyor system of claim 1 wherein the ribbon is adapted to transport single substrate carriers.

10 59. A conveyor system adapted for use in delivering substrate carriers within a semiconductor device manufacturing facility comprising:

15 a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to:

be flexible in a horizontal plane and rigid in a vertical plane;

20 transport a plurality of substrate carriers within the at least a portion of the semiconductor device manufacturing facility; and  
continuously rotate.

60. The conveyor system of claim 59 further comprising at least one driving wheel adapted to contact the  
25 ribbon and to rotate the ribbon.

61. The conveyor system of claim 59 further comprising at least one constraining wheel adapted to contact the ribbon and to reduce lateral motion of the  
30 ribbon as the ribbon rotates.

62. The conveyor system of claim 59 further comprising at least one support wheel adapted to support the ribbon as the ribbon rotates.

5           63. The conveyor system of claim 59 wherein the ribbon comprises:

                  a vertical portion adapted to support substrate carriers; and

10                   a horizontal portion adapted to support a weight of the ribbon.

64. The conveyor system of claim 59 wherein the ribbon comprises:

                  a first section having:

15                   a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a weight of the ribbon; and

20                   a second section coupled to the first section and having:

                  a vertical portion adapted to support substrate carriers; and

25                   a horizontal portion adapted to support a weight of the ribbon.

65. The conveyor system of claim 59 wherein the ribbon comprises stainless steel.

30           66. The conveyor system of claim 59 wherein the ribbon comprises a vertical portion having a first feature adapted to identify a beginning of the ribbon.

67. The conveyor system of claim 66 wherein the vertical portion of the ribbon further comprises a plurality of second features, each second feature adapted to identify a location at which a substrate carrier may be held and transported by the ribbon.

68. The conveyor system of claim 59 wherein the ribbon forms a serpentine closed loop.

69. The conveyor system of claim 59 further comprising a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a substrate carrier within the at least a portion of the semiconductor device manufacturing facility.

70. The conveyor system of claim 59 further comprising a plurality of housing sections adapted to surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

71. The conveyor system of claim 70 wherein at least one housing section comprises:

a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

72. The conveyor system of claim 71 wherein the at least one housing section further comprises:

a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

5           73. The conveyor system of claim 59 further comprising a plurality of supports adapted to couple to and support each housing section.

10           74. The conveyor system of claim 73 further comprising a plurality of shields adapted to couple to the plurality of supports and sized to cover substrate carriers being transported by the ribbon.

15           75. The conveyor system of claim 59 wherein the ribbon is adapted to transport single substrate carriers.

          76. A conveyor system adapted for use in delivering substrate carriers within a semiconductor device manufacturing facility comprising:

20           a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to:

                  be flexible in a horizontal plane and rigid in a vertical plane; and

25           continuously rotate; and

                  a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a substrate carrier within the at least a portion of the semiconductor device manufacturing facility.

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          77. The conveyor system of claim 76 further comprising at least one of a driving wheel, a constraining

wheel and a support wheel adapted to contact the ribbon and to be changed while the ribbon is in motion.

5 78. The conveyor system of claim 76 wherein the ribbon comprises:

a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon.

10

79. The conveyor system of claim 76 wherein the ribbon comprises:

a first section having:

15 a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon; and

a second section coupled to the first section and having:

20 a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon.

25 80. The conveyor system of claim 76 wherein the ribbon comprises stainless steel.

81. The conveyor system of claim 76 wherein the ribbon comprises a vertical portion having a first feature  
30 adapted to identify a beginning of the ribbon.

82. The conveyor system of claim 81 wherein the vertical portion of the ribbon further comprises a plurality

of second features, each second feature adapted to identify a location at which a substrate carrier may be held and transported by the ribbon.

5                   83. The conveyor system of claim 76 wherein the ribbon forms a serpentine closed loop.

                  84. The conveyor system of claim 76 further comprising a plurality of housing sections adapted to  
10 surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

                  85. The conveyor system of claim 84 wherein at least one housing section comprises:

15                   a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

                  a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce  
20 lateral motion of the ribbon as the ribbon rotates.

                  86. The conveyor system of claim 85 wherein the at least one housing section further comprises:

25                   a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

                  87. The conveyor system of claim 84 further comprising a plurality of supports adapted to couple to and  
30 support each housing section.

                  88. The conveyor system of claim 87 further comprising a plurality of shields adapted to couple to the

plurality of supports and sized to cover substrate carriers being transported by the ribbon.

89. The conveyor system of claim 76 wherein the  
5 ribbon is adapted to transport single substrate carriers.

90. A conveyor system adapted for use in delivering substrate carriers within a semiconductor device manufacturing facility comprising:

10 a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to:

be flexible in a horizontal plane and rigid in a vertical plane;

15 transport a plurality of substrate carriers within the at least a portion of the semiconductor device manufacturing facility; and

continuously rotate; and

20 at least one of a driving wheel, a constraining wheel and a support wheel adapted to contact the ribbon and to be changed while the ribbon is in motion.

91. The conveyor system of claim 90 further comprising at least one driving wheel adapted to contact the  
25 ribbon and to rotate the ribbon.

92. The conveyor system of claim 90 further comprising at least one constraining wheel adapted to contact the ribbon and to reduce lateral motion of the  
30 ribbon as the ribbon rotates.



93. The conveyor system of claim 90 further comprising at least one support wheel adapted to support the ribbon as the ribbon rotates.

5           94. The conveyor system of claim 90 wherein the ribbon comprises:

                  a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a  
10 weight of the ribbon.

95. The conveyor system of claim 90 wherein the ribbon comprises:

                  a first section having:

15                       a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a weight of the ribbon; and

                  a second section coupled to the first section  
20 and having:

                  a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a weight of the ribbon.

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96. The conveyor system of claim 90 wherein the ribbon comprises stainless steel.

97. The conveyor system of claim 90 wherein the  
30 ribbon comprises a vertical portion having a first feature adapted to identify a beginning of the ribbon.

98. The conveyor system of claim 97 wherein the vertical portion of the ribbon further comprises a plurality of second features, each second feature adapted to identify a location at which a substrate carrier may be held and transported by the ribbon.

99. The conveyor system of claim 90 wherein the ribbon forms a serpentine closed loop.

100. The conveyor system of claim 90 further comprising a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a substrate carrier within the at least a portion of the semiconductor device manufacturing facility.

101. The conveyor system of claim 90 further comprising a plurality of housing sections adapted to surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

102. The conveyor system of claim 101 wherein at least one housing section comprises:

a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

103. The conveyor system of claim 102 wherein the at least one housing section further comprises:

a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

5           104. The conveyor system of claim 102 further comprising a plurality of supports adapted to couple to and support each housing section.

10           105. The conveyor system of claim 104 further comprising a plurality of shields adapted to couple to the plurality of supports and sized to cover substrate carriers being transported by the ribbon.

15           106. The conveyor system of claim 90 wherein the ribbon is adapted to transport single substrate carriers.

          107. A conveyor system adapted for use in delivering substrate carriers within a semiconductor device manufacturing facility comprising:

20           a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility; and

25           a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a single carrier within the at least the portion of the semiconductor device manufacturing facility.

30           108. The conveyor system of claim 107 wherein the ribbon is adapted to continuously rotate during transport and delivery of substrate carriers.

          109. The conveyor system of claim 107 further comprising at least one of a driving wheel, a constraining

wheel and a support wheel adapted to contact the ribbon and to be changed while the ribbon is in motion.

110. The conveyor system of claim 107 wherein the  
5 ribbon comprises:

a vertical portion adapted to support  
substrate carriers; and

a horizontal portion adapted to support a  
weight of the ribbon.

10

111. The conveyor system of claim 107 wherein the  
ribbon comprises:

a first section having:

a vertical portion adapted to support  
15 substrate carriers; and

a horizontal portion adapted to support  
a weight of the ribbon; and

a second section coupled to the first section  
and having:

a vertical portion adapted to support  
20 substrate carriers; and

a horizontal portion adapted to support  
a weight of the ribbon.

112. The conveyor system of claim 107 wherein the  
25 ribbon comprises stainless steel.

113. The conveyor system of claim 107 wherein the  
ribbon comprises a vertical portion having a first feature  
30 adapted to identify a beginning of the ribbon.

114. The conveyor system of claim 113 wherein the  
vertical portion of the ribbon further comprises a plurality

of second features, each second feature adapted to identify a location at which a substrate carrier may be held and transported by the ribbon.

5                   115. The conveyor system of claim 107 wherein the ribbon forms a serpentine closed loop.

                  116. The conveyor system of claim 107 further comprising a plurality of housing sections adapted to  
10 surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

                  117. The conveyor system of claim 116 wherein at least one housing section comprises:

15                   a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

                  a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce  
20 lateral motion of the ribbon as the ribbon rotates.

                  118. The conveyor system of claim 117 wherein the at least one housing section further comprises:

25                   a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

                  119. The conveyor system of claim 116 further comprising a plurality of housing section supports adapted  
30 to couple to and support each housing section.

                  120. The conveyor system of claim 119 further comprising a plurality of shields adapted to couple to the

plurality of housing section supports and sized to cover substrate carriers being transported by the ribbon.

121. The conveyor system of claim 107 wherein the  
5 ribbon is adapted to transport single substrate carriers.

122. A conveyor system adapted for use in delivering substrate carriers within a semiconductor device manufacturing facility comprising:

10 a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to transport a plurality of substrate carriers within the at least a portion of the semiconductor device manufacturing facility; and  
15 at least one of a driving wheel, a constraining wheel and a support wheel adapted to contact the ribbon and to be changed while the ribbon is in motion.

123. The conveyor system of claim 122 further  
20 comprising at least one driving wheel adapted to contact the ribbon and to rotate the ribbon.

124. The conveyor system of claim 122 further comprising at least one constraining wheel adapted to  
25 contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

125. The conveyor system of claim 122 further comprising at least one support wheel adapted to support the  
30 ribbon as the ribbon rotates.

126. The conveyor system of claim 122 wherein the ribbon comprises:

a vertical portion adapted to support  
substrate carriers; and

a horizontal portion adapted to support a  
weight of the ribbon.

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127. The conveyor system of claim 122 wherein the  
ribbon comprises:

a first section having:

10 a vertical portion adapted to support  
substrate carriers; and

a horizontal portion adapted to support  
a weight of the ribbon; and

a second section coupled to the first section  
and having:

15 a vertical portion adapted to support  
substrate carriers; and

a horizontal portion adapted to support  
a weight of the ribbon.

20 128. The conveyor system of claim 122 wherein the  
ribbon comprises stainless steel.

129. The conveyor system of claim 122 wherein the  
ribbon comprises a vertical portion having a first feature  
25 adapted to identify a beginning of the ribbon.

130. The conveyor system of claim 129 wherein the  
vertical portion of the ribbon further comprises a plurality  
of second features, each second feature adapted to identify  
30 a location at which a substrate carrier may be held and  
transported by the ribbon.

131. The conveyor system of claim 122 wherein the ribbon forms a serpentine closed loop.

5 132. The conveyor system of claim 122 further comprising a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a substrate carrier within the at least a portion of the semiconductor device manufacturing facility.

10 133. The conveyor system of claim 122 further comprising a plurality of housing sections adapted to surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

15 134. The conveyor system of claim 133 wherein at least one housing section comprises:

a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

20 a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

25 135. The conveyor system of claim 134 wherein the at least one housing section further comprises:

a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

30 136. The conveyor system of claim 133 further comprising a plurality of supports adapted to couple to and support each housing section.



137. The conveyor system of claim 136 further comprising a plurality of shields adapted to couple to the plurality of supports and sized to cover substrate carriers being transported by the ribbon.

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138. The conveyor system of claim 122 wherein the ribbon is adapted to transport single substrate carriers.

139. A conveyor system adapted for use in  
10 delivering substrate carriers within a semiconductor device manufacturing facility comprising:

a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to:

15 be flexible in a horizontal plane and rigid in a vertical plane; and

transport a plurality of substrate carriers within the at least a portion of the semiconductor device manufacturing facility; and

20 at least one of a driving wheel, a constraining wheel and a support wheel adapted to contact the ribbon and to be changed while the ribbon is in motion.

140. The conveyor system of claim 139 wherein the  
25 ribbon comprises:

a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon.

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141. The conveyor system of claim 139 wherein the ribbon comprises:

a first section having:

a vertical portion adapted to support  
substrate carriers; and

a horizontal portion adapted to support  
a weight of the ribbon; and

5 a second section coupled to the first section  
and having:

a vertical portion adapted to support  
substrate carriers; and

10 a horizontal portion adapted to support  
a weight of the ribbon.

142. The conveyor system of claim 139 wherein the  
ribbon comprises stainless steel.

15 143. The conveyor system of claim 139 wherein the  
ribbon comprises a vertical portion having a first feature  
adapted to identify a beginning of the ribbon.

20 144. The conveyor system of claim 143 wherein the  
vertical portion of the ribbon further comprises a plurality  
of second features, each second feature adapted to identify  
a location at which a substrate carrier may be held and  
transported by the ribbon.

25 145. The conveyor system of claim 139 wherein the  
ribbon forms a serpentine closed loop.

30 146. The conveyor system of claim 139 further  
comprising a plurality of supports rigidly coupled to the  
ribbon, each support adapted to support and transport a  
substrate carrier within the at least a portion of the  
semiconductor device manufacturing facility.

147. The conveyor system of claim 139 further comprising a plurality of housing sections adapted to surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

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148. The conveyor system of claim 147 wherein at least one housing section comprises:

a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

10

a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

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149. The conveyor system of claim 148 wherein the at least one housing section further comprises:

a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

20

150. The conveyor system of claim 147 further comprising a plurality of supports adapted to couple to and support each housing section.

25

151. The conveyor system of claim 150 further comprising a plurality of shields adapted to couple to the plurality of supports and sized to cover substrate carriers being transported by the ribbon.

30

152. The conveyor system of claim 139 wherein the ribbon is adapted to transport single substrate carriers.

153. An overhead conveyor system adapted for use in delivering single substrate carriers within a semiconductor device manufacturing facility comprising:

a ribbon that forms a closed loop along at least a portion of the semiconductor device manufacturing facility, the ribbon adapted to:

be flexible in a horizontal plane and rigid in a vertical plane; and

continuously rotate;

a plurality of supports rigidly coupled to the ribbon, each support adapted to support and transport a single substrate carrier within the at least a portion of the semiconductor device manufacturing facility;

at least one driving wheel adapted to contact the ribbon and to rotate the ribbon;

at least one constraining wheel adapted to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates; and

at least one support wheel adapted to support the ribbon as the ribbon rotates;

wherein the at least one driving wheel, the at least one constraining wheel and the at least one support wheel are each adapted to be changed while the ribbon is in motion.

154. The conveyor system of claim 153 wherein the ribbon comprises:

a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon.

155. The conveyor system of claim 153 wherein the ribbon comprises:

a first section having:

5 a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon; and

a second section coupled to the first section and having:

10 a vertical portion adapted to support substrate carriers; and

a horizontal portion adapted to support a weight of the ribbon.

15 156. The conveyor system of claim 153 wherein the ribbon comprises stainless steel.

157. The conveyor system of claim 153 wherein the ribbon comprises a vertical portion having a first feature  
20 adapted to identify a beginning of the ribbon.

158. The conveyor system of claim 157 wherein the vertical portion of the ribbon further comprises a plurality of second features, each second feature adapted to identify  
25 a location at which a substrate carrier may be held and transported by the ribbon.

159. The conveyor system of claim 153 wherein the ribbon forms a serpentine closed loop.

30 160. The conveyor system of claim 153 further comprising a plurality of housing sections adapted to

surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

161. The conveyor system of claim 160 wherein at  
5 least one housing section comprises:

a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

10 a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

162. The conveyor system of claim 161 wherein the at least one housing section further comprises:

15 a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

163. The conveyor system of claim 160 further  
20 comprising a plurality of housing section supports adapted to couple to and support each housing section.

164. The conveyor system of claim 163 further  
25 comprising a plurality of shields adapted to couple to the plurality of housing section supports and sized to cover substrate carriers being transported by the ribbon.

165. A method of transporting substrate carriers comprising:

30 forming a closed loop along at least a portion of a semiconductor device manufacturing facility with a ribbon, the ribbon adapted to be flexible in a horizontal plane and rigid in a vertical plane; and

transporting a substrate carrier within the at least a portion of the semiconductor device manufacturing facility with the ribbon.

5                   166. The method of claim 165 wherein the ribbon comprises:

                  a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a weight of the ribbon.  
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                  167. The method of claim 165 wherein the ribbon comprises:

                  a first section having:

15                   a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a weight of the ribbon; and

                  a second section coupled to the first section and having:  
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                  a vertical portion adapted to support substrate carriers; and

                  a horizontal portion adapted to support a weight of the ribbon.  
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                  168. The method of claim 165 wherein the ribbon comprises stainless steel.

                  169. The method of claim 165 wherein the ribbon comprises a vertical portion having a first feature adapted to identify a beginning of the ribbon.  
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170. The method of claim 169 wherein the vertical portion of the ribbon further comprises a plurality of second features, each second feature adapted to identify a location at which a substrate carrier may be held and transported by the ribbon.

171. The method of claim 165 wherein forming a closed loop comprises forming a serpentine closed loop.

172. The method of claim 165 further comprising rigidly coupling a plurality of supports to the ribbon, each support adapted to support and transport a substrate carrier within the at least a portion of the semiconductor device manufacturing facility.

173. The method of claim 165 further comprising employing a plurality of housing sections to surround at least a portion of the ribbon while allowing substrate carriers to be transported by the ribbon.

174. The method of claim 165 wherein at least one housing section comprises:

a first opening adapted to allow at least one support wheel to contact and support the ribbon as the ribbon rotates; and

a second opening adapted to allow at least one constraining wheel to contact the ribbon and to reduce lateral motion of the ribbon as the ribbon rotates.

175. The method of claim 174 wherein the at least one housing section further comprises:



a third opening adapted to allow at least one driving wheel to contact the ribbon and to rotate the ribbon.

5                   176. The method of claim 165 wherein transporting substrate carriers comprises transporting single substrate carriers.

10                   177. A method of transporting single substrate carriers within a semiconductor device manufacturing facility comprising:

                  forming a closed loop along at least a portion of the semiconductor device manufacturing facility with a ribbon, the ribbon adapted to be flexible in a horizontal plane and rigid in a vertical plane;

15                   rigidly coupling a plurality of supports to the ribbon, each support adapted to support and transport a single substrate carrier within the at least a portion of the semiconductor device manufacturing facility;

20                   contacting the ribbon with at least one driving wheel adapted to rotate the ribbon;

                  contacting the ribbon with at least one constraining wheel adapted to reduce lateral motion of the ribbon as the ribbon rotates;

25                   contacting the ribbon with at least one support wheel adapted to support the ribbon as the ribbon rotates, wherein the at least one driving wheel, the at least one constraining wheel and the at least one support wheel are each adapted to be changed while the ribbon is in motion; and

30                   continuously rotating the ribbon during transporting of single substrate carriers with the ribbon.

178. An apparatus adapted for use in transporting substrates within a semiconductor device manufacturing facility comprising:

a ribbon adapted to be flexible in a horizontal plane and rigid in a vertical plane and to transport one or more substrates within a portion of the semiconductor device manufacturing facility, the ribbon including:

a vertical portion adapted to support one or more substrates; and

a horizontal portion adapted to support a weight of the ribbon.

179. The apparatus of claim 178 wherein the vertical portion is adapted to support one or more substrate carriers.

180. The apparatus of claim 178 wherein at least one of the vertical portion and the horizontal portion comprises stainless steel, polycarbonate, carbon graphite, fiberglass, steel reinforced polyurethane, carbon fiber or polyethelene.

181. The apparatus of claim 178 wherein the ribbon includes an additional horizontal portion positioned to increase symmetrical bending of the ribbon.

182. The apparatus of claim 181 wherein the additional horizontal portion is positioned proximate a bottom of the ribbon.

183. The apparatus of claim 178 wherein the vertical portion includes surface features adapted to engage surface features of a driving wheel.

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184. The apparatus of claim 183 wherein the surface features of the vertical portion comprise teeth.